CHAPTER 35
Pleural Effusion

KEY TEACHING POINTS

- In patients with dyspnea, the following findings increase probability of pleural effusion: abnormal auscultatory percussion, asymmetric chest expansion, diminished vocal resonance, reduced tactile fremitus, diminished breath sound intensity, and percussion dullness.
- The presence of *normal* breath sound intensity and *normal* resonance during percussion decreases significantly the possibility of underlying pleural effusion. Indeed, the diagnosis of pleural effusion is one of the main reasons students should still learn how to percuss the chest.

I. INTRODUCTION

Although ancient Greek physicians routinely recognized and treated empyema, the modern diagnostic signs of pleural effusion date to two physicians: Auenbrugger, who described the pathologic dullness and diminished chest expansion of effusions,[1] and Laennec, who described the uniform absence of breath sounds and, in some patients, the appearance of bronchial breath sounds and abnormal vocal resonance.[2] The introduction of percussion into 19th-century medicine allowed clinicians to routinely distinguish empyema from tuberculosis in patients with chronic respiratory complaints.[3]

The most common causes of pleural effusions today in adults are heart failure, malignancy, pneumonia, and tuberculosis.[4,5]

II. THE FINDINGS

Accumulation of pleural fluid, if large enough, expands the hemithorax (and collapses the underlying lung), which may create the appearance of an asymmetrically enlarged hemithorax with flattening or even bulging of the normally concave intercostal spaces. Because pleural fluid reduces transmission of low-frequency vibrations (see Fig. 30.2), tactile fremitus is diminished on the involved side. All patients have diminished breath sounds, especially in the lower chest, from the combined effects of reduced flow rates (the underlying lung is collapsed) and diminished transmission of the low-frequency vesicular breath sounds through the fluid.

Nonetheless, testing of vocal resonance (i.e., sound of the patient's voice through the clinician's stethoscope) may produce either of two distinct findings: (1) vocal resonance may be diminished or absent (the patient's voice is muted compared with the uninvolved sign), or (2) vocal resonance may be "abnormal," causing egophony, bronchophony, whispered pectoriloquy, and, often, bronchial breath sounds. Chapter 30 discusses further these paradoxical findings (in the section on vocal resonance).

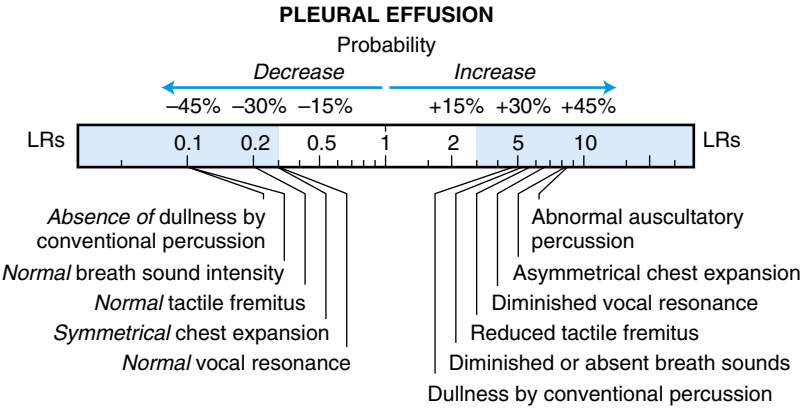
III. CLINICAL SIGNIFICANCE

Several findings increase the probability of pleural effusion: abnormal auscultatory percussion (likelihood ratio [LR] = 8.3, EBM Box 35.1), asymmetric chest expansion (LR = 8.1), diminished vocal resonance (LR = 6.5), reduced tactile fremitus (LR = 5.7), diminished or absent breath sounds (LR = 5.2), and asymmetric dullness (LR = 4.8). Findings that *decrease* the probability of pleural effusion include normal breath sound intensity (LR = 0.1), normal resonance by percussion (LR = 0.1), normal tactile fremitus (LR = 0.2), symmetric chest expansion (LR = 0.3), and normal vocal resonance (LR = 0.3).

EBM BOX 35.1
*Pleural Effusion**

Finding (Reference)†	*Sensitivity (%)*	*Specificity (%)*	Likelihood Ratio‡ if Finding Is	
			Present	*Absent*
Inspection				
Asymmetric chest expansion[6]	74	91	**8.1**	**0.3**
Palpation				
Reduced tactile fremitus[6]	82	86	**5.7**	**0.2**
Percussion				
Dullness by conventional percussion[6]	89	81	**4.8**	**0.1**
Abnormal auscultatory percussion (method of Guarino)[6,7]	58-96	85-95	**8.3**	NS
Auscultation				
Diminished or absent breath sounds[6]	88	83	**5.2**	**0.1**
Diminished vocal resonance[6]	76	88	**6.5**	**0.3**
Crackles[6]	44	38	NS	1.5
Pleural rub[6]	5	99	NS	NS

*Diagnostic standard: For *pleural effusion,* chest radiograph.
†Definition of findings: For *abnormal auscultatory percussion*, the method of Guarino[7] (see the section on auscultatory percussion in Chapter 29); for *diminished vocal resonance intensity*, the transmitted sounds from the patient's voice when reciting numbers, as detected by a stethoscope on the patient's posterior chest, are reduced or absent;[6] for all other findings, see Chapters 28 to 30.
‡Likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.
NS, Not significant.
Click here to access calculator



In one study of patients with acute respiratory distress syndrome requiring mechanical ventilation, the absence of breath sounds over a region of the chest increased the probability of underlying pleural fluid at that specific location (LR = 4.3).[8]

The references for this chapter can be found on www.expertconsult.com.

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REFERENCES

1. Auenbrugger L. *On Percussion of the Chest (1761), Being a Translation of Auenbrugger's Original Treatise Entitled "Inventum Novum ex Percussione Thoracis Humani, ut Signo Abstrusos Interni Pectoris Morbos Detegendi."* (facsimile edition by Johns Hopkins Press). Baltimore, MD: The Johns Hopkins Press; 1936.
2. Laennec RTH. *A Treatise on the Diseases of the Chest*. (facsimile edition by *Classics of Medicine Library*). London: T. and G. Underwood; 1821.
3. McGee S. Percussion and physical diagnosis: separating myth from science. *Disease-a-Month*. 1995;41(10):643–692.
4. Aleman C, Alegre J, Armadans L, et al. The value of chest roentgenography in the diagnosis of pneumothorax after thoracentesis. *Am J Med*. 1999;107:340–343.
5. Light RW. Clinical practice: pleural effusion. *N Engl J Med*. 2002;346(25):1071–1077.
6. Kalantri S, Joshi R, Lokhande T, et al. Accuracy and reliability of physical signs in the diagnosis of pleural effusion. *Respir Med*. 2007;101:431–438.
7. Guarino JR, Guarino JC. Auscultatory percussion: a simple method to detect pleural effusion. *J Gen Intern Med*. 1994;9:71–74.
8. Lichtenstein D, Goldstein I, Mourgeon E, Cluzel P, Grenier P, Rouby JJ. Comparative diagnostic performance of auscultation, chest radiography, and lung ultrasonography in acute respiratory distress syndrome. *Anesthesiology*. 2004;10(1):9–15.